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## U.S.-JAPAN COMPETITION IN PHARMACEUTICALS

Summary

Japan's high-flying pharmaceutical industry has had its wings clipped. No longer can drug makers count on double-digit sales gains at home to fund the research that transformed them during the 1970s from manufacturers and distributors of licensed products into developers of safer, more effective versions of existing drugs and, more recently, originators of some innovative compounds. Tokyo's campaign to contain its soaring health-care bill has meant flat or even lower sales and earnings for the leading Japanese drug producers. And in a double blow, domestic heavyweights from other business fields continue to diversify into pharmaceuticals, while big American and European drug companies are starting to flex their competitive muscles in the Japanese marketplace. To help recoup development costs, Japan's drug manufacturers are licensing their products to foreign firms; a few are also setting up marketing joint ventures with pharmaceutical houses in the United States and Europe. The returns from this strategy have so far been meager, raising questions about the future competitive status of the Japanese industry.

Playing Catch-up

International competitiveness in the modern pharmaceutical industry hinges on the ability of companies to develop and bring to market a small but steady stream of commercially successful new ethical drugs -- patented products promoted to health professionals and available to consumers by prescription

only. Underlying this capacity is a substantial commitment to research and development, both in terms of money and time. Current estimates peg the cost of discovering, developing and introducing an innovative drug in the United States at \$80 million-plus, while industry sources in Japan place the cost there of moving versions of existing products out of the laboratory at \$20 million and up. Costs, already high because only one out of nine or ten potential new drugs is successfully marketed, have been inflated in both countries by the more extensive toxicology testing and clinical (human) trials now required for regulatory approval of a new compound. Moreover, the process of bringing a new drug to market can take up to 10 years in the United States and even longer in Japan.

By this standard, Japanese pharmaceutical companies are only now beginning to emerge as world-class competitors, having spent the last two decades gaining the financial capability and technical expertise to develop drugs on their own. Japanese firms have largely weaned themselves from almost complete dependence on products licensed from American and European makers, although Tokyo did play a major role in this process during the 1960s and 1970s by fostering a market and business environment conducive to innovation. The creation of a national health-insurance system in 1961 and the decision to allow doctors to dispense drugs bought at prices negotiated with manufacturers, for example, ensured that demand for prescription pharmaceuticals, whether patented or generic (off-patent compounds), would expand at a fast pace. In addition, the government's drug reimbursement system was structured to favor new products at the expense of established brands, giving drug makers an additional inducement to invest in research and development.

Changes in the legal protection afforded new pharmaceutical products also spurred innovation. Prior to January 1976, patents in Japan were granted only on new processes, never on substances. This situation discouraged R&D since companies could legally produce imitations of drugs marketed by other firms simply by coming up with a different production process. Allowing pharmaceutical houses to patent the active ingredient in a new compound for 15 years eliminated this disincentive, but it highlighted another -- the fact that most of the life of a patent has passed before a new drug appears on the market. Tokyo's solution to this problem, effective April 1980, was to extend the period of exclusive sales rights for a new product from three years after it receives production approval to six.

Industry executives and government officials in the United States also maintain that Tokyo encouraged domestic drug development by restricting the activities of American and European companies in Japan. They argue that the ban on the formation of wholly owned foreign manufacturing subsidiaries from 1964 until mid-1975 and regulations that made it hard for firms overseas to supply the Japanese market through exports, including the rule that a new drug could not be registered in Japan unless most preclinical work and all clinical testing was done there, left foreign companies little choice but to license their products to Japanese businesses. Production and/or distribution of licensed products, these critics add, quickly became a major funding vehicle for the domestic R&D effort.

Against this backdrop of largely indirect government support, a dozen specialized prescription drug makers rose to the top of Japan's pharmaceutical industry. Led by Takeda Chemical Industries, Ltd., Sankyo Co., Ltd. and Fujisawa Pharmaceutical Co., Ltd., these companies undertake a significant amount of basic and applied research and development, investing a minimum of 5 percent of total sales in this work. More importantly, each of them has demonstrated the ability to come up with at least a handful of commercially successful new products.

Forming the industry's second tier are another 12 or so specialized producers. Not only do they have lower revenues than their bigger rivals, but their research and development capacity is generally much weaker, in large part because of the limited availability of funding. Below this group are some 300 small and medium-sized companies. Primarily manufacturers of generic drugs with little or no R&D targeted at new drug discoveries, these firms are being squeezed by government policies designed to bolster more innovative companies through greater patent and pricing protection.

Despite the widely divergent abilities of Japanese pharmaceutical companies to undertake new drug development, industry R&D expenditures climbed from ¥55 billion (\$200.9 million) in FY 1973 to ¥289.9 billion (\$1.2 billion) in FY 1983. The payback from this effort can be seen in the jump in new drug introductions by Japanese companies. After unveiling a total of just 155 products in the 20 years through 1980 -- far short of the comparable tallies for the United States (353), France (271) and West Germany (201), Japanese firms moved to the top of the list in the 1981-83 period, bringing to market 41 compounds versus 24 for American corporations, 16 for German businesses and 13 for French competitors.

Antibiotics represent the leading edge of the new drugs coming out of Japanese laboratories. Almost to a company, the top drug firms targeted this class of products for their initial R&D efforts, attracted by the big profits that can be earned from discovering and commercializing replacements for antibiotics no longer effective against certain types of bacteria. Largely bypassing penicillin-type antibiotics, Japanese researchers zeroed in on cephalosporins, which are structurally similar to penicillins but effective against a wider spectrum of bacteria. With a few exceptions, they missed out on the first two generations of cephalosporin products. By the time the third-generation versions appeared on the market in the early 1980s, however, most carried Japanese trademarks. Among the best sellers are Shiomarin, produced by Shionogi & Co., Ltd., the largest Japanese maker of antibiotics; Epocelin, a product of the number-two antibiotic manufacturer, Fujisawa; and Takeda's Bestcall.

Like their cephalosporin antibiotics, most of the other products introduced by Japanese pharmaceutical companies in recent years have been drugs exhibiting greater efficacy and/or safety than compounds already on the market. This fact does not detract from Japan's drug development work: incremental improvements in existing drugs, not breakthroughs, are the rule in the American and European pharmaceutical industries as well. Moreover, Japanese firms have a number of drugs in production or undergoing clinical trials that qualify as innovations in the treatment of cancer and cardiovascular problems.

A New Ball Game

With a big helping hand from the national health-insurance system and the government's generous reimbursement policies for new drugs, whether domestic or foreign, pharmaceutical makers became the high fliers of Japanese industry in the 1970s. Annual sales gains in the double digits were the norm; so were profit margins in the 12 to 13 percent range, even though drug companies were steadily increasing their outlays for R&D. The start of the 1980s, however, marked the arrival of a new era of business conditions for pharmaceutical firms.

Deciding that containment of the steep yearly rise in the government's bill for medical care took priority over the maintenance of a supportive market climate for drug companies, Tokyo initiated a major overhaul of its drug pricing policies. These policies were obvious candidates for reform. In contrast to the United States and Europe, where drug costs average an estimated 13 percent of total medical expenses, pharmaceutical products in Japan represent more than one-third of aggregate health-care expenditures. Moreover, repeated hikes in drug prices were one reason spending on medical care had topped 6 percent of national income by FY 1978.

The thrust of the drug-pricing reform program is straightforward: to narrow the gap between the government-set rates at which medical institutions and doctors are reimbursed for the drugs they use or dispense (standard or official drug prices) and the wholesale prices pharmaceutical companies charge for their products, which were roughly 10 to 20 percent lower for most drugs at the beginning of the 1980s but up to 40 percent less for some products. The mechanics of the revision are more complex.

At the risk of oversimplification, the government's initial step, implemented in February 1978, was to set standard prices for every brand of prescription medicine on the market, not just for groups of similar products, and to implement price cuts on a brand-by-brand basis. It then revamped the formula used to change official prices, going to a variant in January 1983 that more accurately reflects movements in actual selling prices. Moreover, in response to a September 1982 advisory commission recommendation, Tokyo decided to revise standard drug prices across the board at least once every three years, with partial reviews undertaken each year.

These changes do not appear very radical on paper; in practice they have been. In less than four years, average standard drug prices were pared by a cumulative 35 percent, with cuts of 18.6 percent in June 1981, 4.9 percent in January 1983, 16.6 percent in March 1984 and 6 percent this past March. Together with other cost-containment measures, these reductions sliced the annual growth in national medical expenditures from 12.6 percent in the FY 1977-FY 1979 period to 7.3 percent in the early 1980s and just 2.9 percent in FY 1984. But they also took the wind out of the pharmaceutical industry's sails, trimming the yearly increase in output to a single-digit figure and producing an industry first in 1984 -- a drop in production.

With medical institutions and doctors forcing pharmaceutical makers to absorb a major part of the cuts through lower wholesale prices, the effects of the government's pricing reforms quickly showed up on drug company books. By

design, manufacturers of generic products have been hit the hardest, but second-tier producers are also starting to reel if they have no recently introduced big sellers from their own research labs on the market. Even the industry's leaders are feeling the pinch. Takeda's pharmaceutical sales have been flat for the last three fiscal years and its total operating income, derived mainly from drugs, has dropped by one-sixth. The story is no different at Fujisawa and Shionogi. Number-two Sankyo as well as Eisai Co., Ltd., Yamanouchi Pharmaceutical Co., Ltd. and Tanabe Seiyaku Co., Ltd. have managed to generate some growth in revenues, but their operating results are also on the decline.

Since Tokyo's cost containment drive shows no signs of flagging, Japanese drug companies are being forced to rethink corporate strategy. The obvious answer is to insulate themselves from the brunt of future price cuts by introducing products that can command high standard drug prices. This solution, however, is easier outlined than implemented. Aside from the time it takes to bring a new drug to market and the generally limited number of products companies now have in the pipeline, there is the money question.

Awed by the recent successes of Japanese companies in the international drug introduction sweepstakes, industry watchers often forget that Japanese pharmaceutical makers are midgets in a world industry dominated by American and European multinationals. With pharmaceutical sales of \$1.2 billion in FY 1984, Takeda just makes the list of the world's 20 largest drug companies, while Sankyo's FY 1984 revenues of \$0.8 billion would only rank it in the mid teens on a roster of the biggest U.S. drug manufacturers.

Japanese makers similarly fall short of their American rivals in R&D expenditures. The U.S. drug industry typically outspends its Japanese counterpart by a margin of almost three to one, allocating roughly 10 to 11 percent of sales to R&D compared with a 5 to 6 percent ratio in Japan. To cite just one example, Merck & Co., Inc., the top U.S. pharmaceutical company, earmarked 11 percent of its total 1984 revenues, or \$393.1 million, for research and development, mainly in the drug field; in contrast, Takeda's total FY 1984 R&D expenditures of \$117.9 million only equaled 6.1 percent of aggregate sales.

#### Competitors Flex Their Muscles

Already the big spenders in an industry where R&D funding levels are the key to competitive strength, American and European multinationals are not making it any easier for Japanese challengers to generate money at home for drug development. Over the last two years or so, major international players have launched phase one of a long-term campaign to beef up their position in the Japanese market. Companies previously content to just license their products to Japanese producers are establishing a production base in Japan. Foreign firms that had been manufacturing through joint ventures are buying out their Japanese partners or at least gaining a controlling interest in the operation. Many of these same companies are also switching marketing channels, replacing Japanese distributors with in-house sales forces. Moreover, one multinational after another has unveiled plans for an expanded research and development capability in Japan.

American and European drug makers are being pushed and pulled into a bigger presence in Japan. With drug development costs skyrocketing, they cannot afford a business-as-usual approach to the world's second-largest pharmaceutical market. At the same time, Tokyo has loosened -- but not removed -- the handcuffs on foreign drug firms. Since October 1976, for example, most preclinical work performed abroad has been accepted on new drug approval applications, while over the past two-and-a-half years the government has approved the use of American, Swiss and British data from acute and subacute toxicity tests, the major exception to the 1976 regulations. Under continued pressure from Washington, Japan has also backed away from its ban on foreign clinical test findings. As part of the July 1985 market access package, Tokyo agreed to accept the results of drug trials on foreigners for those tests unaffected by racial differences. This change will not eliminate the need for duplicative testing by U.S. and European drug companies anxious to introduce new products to the Japanese market, but it should reduce the cost and time involved in repeat testing.

Examples abound of the new aggressiveness of big international drug manufacturers in Japan, but the company that has captured the headlines is Merck. The top U.S. maker is a veteran of the Japanese market, having formed a joint venture with Banyu Pharmaceutical Co., Ltd. in 1954 to manufacture and market Merck products. By 1982 Nippon Merck-Banyu Co., Ltd.'s sales had reached \$140 million or so, derived mainly from antibiotics, cardiovascular products and anti-inflammatories. This total placed Merck among the bigger foreign producers in Japan, but it fell far short of the amount of business the company thought it should be doing in the number-two drug market. The main problem, corporate executives concluded, was that the joint venture did not have a sales force large enough to go head-to-head with the top Japanese producers.

Merck's solution to its lack of marketing clout was unconventional. In back-to-back moves, it spent \$300 million-plus to acquire a 50.02 percent stake in Banyu, a top-ten manufacturer, in a two-step transaction completed in October 1984, and bought a controlling interest in Torii Yakuhin K.K., a small drug company. With the merger of the Banyu and Nippon Merck-Banyu sales forces in January 1985, the American maker gained access to a sales force of more than 1,000 -- a number that puts it in the same league as Takeda and other big Japanese manufacturers. Moreover, Merck's five manufacturing sites and three research facilities in Japan place it on an equal footing with the country's major producers.

Merck's purchase of Torii and Banyu, which had sales of \$250.6 million in FY 1984, has lifted the company to the head of the list of foreign drug producers, replacing Pfizer Inc. Like its larger rival, Pfizer is an old-timer in Japan, going back to 1953. But aside from switching partners in 1955 and gradually buying out that company's holding in Pfizer Taito Co., Ltd., Pfizer's rise to the top was strictly by the book. Pfizer Taito has built its sales force into an 880-person unit. The number-three U.S. drug manufacturer has also invested heavily in R&D in Japan, making Pfizer Taito's recently expanded Nagoya complex one of five major Pfizer research facilities around the world. In 1984, this two-pronged strategy and a product line slanted toward antibiotics produced sales of roughly \$267 million for Pfizer in its top international market.

Despite their different Japan strategies, Merck and Pfizer have settled on the same marketing tactic -- direct distribution. West Germany's Hoechst A.G., number three in Japan but first in the world market, and Bristol-Myers Co. have also gone this route from the start of their Japanese operations. Foreign drug companies that took the opposite approach -- sales through distributors -- are now changing course, deciding that Japanese competitors are not the best candidates to handle their product lines. Schering-Plough Corp. took over distribution of its products in 1983 through its Essex Nippon K.K. unit, while Switzerland's Ciba-Geigy A.G., which had used the Takeda and Fujisawa sales networks for almost 30 years, put together a 600-person sales force this year. Other foreign manufacturers are likely to follow their example.

American and European competitors are also taking a page from Merck and Pfizer and expanding their Japanese research and development capacity. To cite just one example, the Upjohn Co., which already has a lab in Japan, announced earlier this year that it would invest \$50 million in a new R&D facility; on completion, the complex will be the company's largest outside corporate headquarters. Other foreign drug companies, such as G.D. Searle & Co., are putting their money into a Japanese manufacturing presence.

Whatever the direction of their drive in Japan, multinational drug companies share a common objective: to raise their direct market stake from the estimated 15 percent level. A major push by the international industry's giants would be troublesome for Japanese challengers under any conditions, but it is doubly so when domestic demand for pharmaceutical products is marking time. To make matters worse, growing numbers of big Japanese companies from outside the industry are maneuvering to break into the drug business or have already diversified into pharmaceuticals.

#### New Game Plan Needed

Squeezed at home by both market and business forces, Japan's leading drug companies have moved into new territory -- the international market -- in an effort to expand funding for new drug development and recoup some of the costs of existing products. Licensing arrangements have been the main vehicle, with cephalosporin antibiotics and other innovative drugs providing the ticket. The list of companies that have licensed Japanese products reads like a who's who of the American and European pharmaceutical industries -- confirmation of Japan's prowess in new drug development but evidence as well that huge R&D costs are forcing major multinationals to cut back on in-house work.

Despite their numerous licensing agreements, Japanese drug makers are discovering what American manufacturers found out before them: that licensing arrangements are generally less profitable than direct sales. A glance at the trade data underscores this point. In FY 1983 Japanese drug companies received \$42.1 million in royalties; in calendar 1983 Japan's exports of pharmaceuticals totaled \$531.3 million, even though makers have been far less successful in international marketing than in licensing. Moreover, drug firms in Japan had to pay more in licensing fees in FY 1983 -- \$52.3 million -- than they earned.

The money to be made from direct sales has persuaded a few major Japanese drug manufacturers to try selling in the American or European markets,

but in venturing abroad, these companies have almost always tied up with foreign partners. Two such operations have been set up in the United States. In late 1981, Fujisawa and SmithKline Beckman Corp., which have had a joint marketing organization in Japan since 1977, formed a company in Philadelphia to develop and sell Fujisawa products. Their first drug, a third-generation cephalosporin, has been on the market for two years. The other joint venture pairs Takeda and Abbott Laboratories. TAP Pharmaceuticals was established in Chicago in 1977 to develop and market drugs based on Takeda's research. Its first product, introduced in May and manufactured by Abbott, is a treatment for advanced prostate cancer. Three other TAP products -- two cephalosporins and a benzodiazepine hypnotic sedative -- are awaiting Food and Drug Administration approval.

Operations such as these are still too few in number and new to have much impact on export earnings, either at the company or the industry level. In fact, overseas drug sales are equivalent to just 3 percent of Japanese production, and for some major producers like Sankyo and Shionogi, the ratio is not even that high. Moreover, increasing exports are doing nothing to narrow Japan's large deficit in pharmaceuticals, which has fluctuated between \$800 million and \$900 million in recent years.

The list of constraints on the money-making ability of Japanese drug manufacturers grows ever longer. Analysts in Japan have predicted for some time that the industry is headed for a shake-out that will eliminate many small and medium-sized producers. Such a development would take some pressure off of larger drug makers, but it would not guarantee the maintenance of their recently achieved international competitiveness. Business tie-ups or even mergers might still be necessary.

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The views expressed in this report are those of the author and do not necessarily reflect those of the Japan Economic Institute.

Table 1: Japan's Pharmaceutical Market, 1980-84

|                                                                        | 1980       | 1981       | 1982       | 1983       | 1984       |
|------------------------------------------------------------------------|------------|------------|------------|------------|------------|
| (in billions of yen)                                                   |            |            |            |            |            |
| Production                                                             | Y3,482.2   | Y3,679.1   | Y3,980.2   | Y4,032.1   | Y3,966.9   |
| Total Exports (f.o.b.)                                                 | 93.9       | 101.7      | 108.0      | 126.2      | 128.8      |
| Total Imports (c.i.f.)                                                 | 262.4      | 275.7      | 332.4      | 311.5      | 321.1      |
| Trade Balance                                                          | -168.5     | -174.0     | -224.4     | -185.3     | -192.3     |
| Exports to United States (f.o.b.)                                      | 23.2       | 30.1       | 31.9       | 43.3       | n.a.       |
| Imports from United States (c.i.f.)                                    | 71.2       | 86.2       | 120.3      | 117.5      | n.a.       |
| Trade Balance                                                          | -48.0      | -56.1      | -88.4      | -74.2      | n.a.       |
| Total Exports as Percent of Production                                 | 2.7%       | 2.8%       | 2.7%       | 3.1%       | 3.2%       |
| Total Imports as Percent of Apparent Domestic Consumption              | 7.2%       | 7.2%       | 7.9%       | 7.4%       | 7.7%       |
| Exports to United States as Percent of Production                      | 0.7%       | 0.8%       | 0.8%       | 1.1%       | n.a.       |
| Imports from United States as Percent of Apparent Domestic Consumption | 2.0%       | 2.2%       | 2.9%       | 2.8%       | n.a.       |
| (in million of dollars*)                                               |            |            |            |            |            |
| Production                                                             | \$15,357.7 | \$16,682.2 | \$15,979.6 | \$16,976.6 | \$16,701.3 |
| Total Exports (f.o.b.)                                                 | 412.4      | 462.5      | 434.9      | 531.3      | 543.6      |
| Total Imports (c.i.f.)                                                 | 1,151.5    | 1,253.5    | 1,338.8    | 1,311.2    | 1,355.3    |
| Trade Balance                                                          | -739.1     | -791.0     | -903.9     | -779.9     | -811.7     |
| Exports to United States (f.o.b.)                                      | 101.9      | 136.7      | 128.4      | 182.3      | n.a.       |
| Imports from United States (c.i.f.)                                    | 312.7      | 391.7      | 484.4      | 494.5      | n.a.       |
| Trade Balance                                                          | -210.8     | -255.0     | -356.0     | -312.2     | n.a.       |

\*The following average annual exchange rates were used to convert the yen figures in dollars:  
 Production - 1980, Y226.74; 1981, Y220.34; 1982, Y249.08; 1983, Y237.51; and 1984, Y237.52.  
 Exports - 1980, Y227.67; 1981, Y219.90; 1982, Y248.33; 1983, Y237.52; and 1984, Y236.95.  
 Imports - 1980, Y227.85; 1981, Y219.94; 1982, Y248.30; 1983, Y237.55; and 1984, Y236.91.

Sources: Ministry of Health and Welfare and Japan Tariff Association

Table 2: Production of Pharmaceuticals in Japan, 1980-84

(in billions of yen)

|                                       | <u>1980</u> | <u>1981</u> | <u>1982</u> | <u>1983</u> | <u>1984*</u> |
|---------------------------------------|-------------|-------------|-------------|-------------|--------------|
| Antibiotics and Other Anti-infectives | Y814.3      | Y780.1      | Y865.2      | Y735.9      |              |
| Cardiovascular Agents                 | 377.8       | 438.0       | 440.3       | 509.2       |              |
| Central Nervous System Agents         | 344.2       | 353.9       | 387.6       | 395.5       |              |
| Miscellaneous Metabolic Agents        | 364.0       | 369.3       | 370.1       | 363.2       |              |
| Gastrointestinal Agents               | 256.8       | 282.6       | 321.5       | 340.6       |              |
| Vitamins                              | 216.3       | 240.9       | 271.0       | 277.4       |              |
| Dermatological Agents                 | 198.0       | 214.5       | 224.5       | 243.7       |              |
| Biologicals                           | 114.4       | 140.1       | 157.5       | 163.9       |              |
| Antitumor Agents                      | 107.4       | 122.6       | 124.5       | 134.7       |              |
| Nutrients, Tonics and Alternatives    | 85.7        | 97.7        | 113.6       | 119.1       |              |
| Medicines for the Blood               | 82.7        | 91.1        | 101.1       | 117.8       |              |
| Respiratory System Agents             | 80.0        | 86.1        | 90.6        | 98.7        |              |
| Hormones                              | 89.3        | 85.1        | 97.3        | 95.7        |              |
| Peripheral Nervous System Agents      | 80.3        | 83.3        | 80.8        | 79.8        |              |
| Sensory Organ Agents                  | 45.0        | 46.7        | 54.7        | 58.9        |              |
| Herb Medicines                        | 33.8        | 47.6        | 58.3        | 53.7        |              |
| Drugs for Allergies                   | 36.0        | 36.1        | 44.4        | 48.4        |              |
| Genitourinary Agents                  | 34.6        | 35.7        | 41.5        | 40.9        |              |
| Diagnostic Agents                     | 30.2        | 31.4        | 32.9        | 35.1        |              |
| Chemotherapy Drugs                    | 29.5        | 28.6        | 30.2        | 33.6        |              |
| Other Pharmaceuticals                 | 61.9        | 67.7        | 72.6        | 86.3        |              |
| Total Production                      | 3,482.2     | 3,679.1     | 3,980.2     | 4,032.1     | 3,966.9      |

\*The Ministry of Health and Welfare is in the process of revising the product categories that make up the pharmaceuticals production data. Product breakdowns for 1984 will therefore not be available until later this year.

Source: Ministry of Health and Welfare, Pharmaceutical Affairs Bureau

Table 3: Production of Prescription Pharmaceuticals in Japan by Source of Ingredients, 1980-83

(in billions of yen)

|                                                               | 1980     |        | 1981     |        | 1982     |        | 1983     |        |
|---------------------------------------------------------------|----------|--------|----------|--------|----------|--------|----------|--------|
|                                                               | Value    | Share  | Value    | Share  | Value    | Share  | Value    | Share  |
| Total Production                                              | Y3,482.2 | 100.0% | Y3,679.1 | 100.0% | Y3,980.2 | 100.0% | Y4,032.1 | 100.0% |
| Prescription Drugs                                            | 2,978.4  | 85.5   | 3,135.7  | 85.2   | 3,406.5  | 85.6   | 3,438.6  | 85.3   |
| Domestic Drugs                                                | 1,981.3  | 56.9   | 2,161.2  | 58.7   | 2,339.0  | 58.8   | 2,382.6  | 59.1   |
| Imported Drugs                                                | 997.2    | 28.6   | 974.5    | 26.5   | 1,067.5  | 26.8   | 1,056.0  | 26.2   |
| Nonprescription Drugs                                         | 503.7    | 14.5   | 543.4    | 14.8   | 573.7    | 14.4   | 593.5    | 14.7   |
| Antibiotics and Anti-infectives                               | 814.3    | 100.0  | 780.1    | 100.0  | 865.2    | 100.0  | 735.9    | 100.0  |
| Prescription Drugs                                            | 814.3    | 100.0  | 780.1    | 100.0  | 865.2    | 100.0  | 735.9    | 100.0  |
| Domestic Drugs                                                | 425.9    | 52.3   | 422.8    | 54.2   | 474.9    | 54.9   | 417.6    | 56.7   |
| Imported Drugs                                                | 388.5    | 47.7   | 357.3    | 45.8   | 390.2    | 45.1   | 318.3    | 43.3   |
| Nonprescription Drugs                                         | 0.0      | 0.0    | 0.0      | 0.0    | 0.0      | 0.0    | 0.0      | 0.0    |
| Antitumor Agents, Hormones and Miscellaneous Metabolic Agents | 560.6    | 100.0  | 577.0    | 100.0  | 591.9    | 100.0  | 593.6    | 100.0  |
| Prescription Drugs                                            | 451.1    | 80.5   | 449.1    | 77.8   | 467.4    | 79.0   | 463.4    | 78.1   |
| Domestic Drugs                                                | 339.6    | 60.6   | 349.9    | 60.6   | 369.2    | 62.4   | 358.1    | 60.3   |
| Imported Drugs                                                | 111.6    | 19.9   | 99.2     | 17.2   | 98.2     | 16.6   | 105.3    | 17.7   |
| Nonprescription Drugs                                         | 109.5    | 19.5   | 127.9    | 22.2   | 124.5    | 21.0   | 130.2    | 21.9   |
| Cardiovascular Agents                                         | 377.8    | 100.0  | 438.0    | 100.0  | 440.3    | 100.0  | 509.2    | 100.0  |
| Prescription Drugs                                            | 361.7    | 95.8   | 423.0    | 96.6   | 425.7    | 96.7   | 495.5    | 97.3   |
| Domestic Drugs                                                | 224.4    | 59.4   | 268.2    | 61.2   | 282.7    | 64.2   | 316.8    | 62.2   |
| Imported Drugs                                                | 137.3    | 36.3   | 154.9    | 35.4   | 143.0    | 32.5   | 178.7    | 35.1   |
| Nonprescription Drugs                                         | 16.0     | 4.2    | 15.0     | 3.4    | 14.6     | 3.3    | 13.7     | 2.7    |
| Central and Peripheral Nervous System Agents                  | 424.5    | 100.0  | 437.2    | 100.0  | 468.4    | 100.0  | 475.3    | 100.0  |
| Prescription Drugs                                            | 351.4    | 82.8   | 357.1    | 81.7   | 376.2    | 80.3   | 385.3    | 81.1   |
| Domestic Drugs                                                | 199.2    | 46.9   | 207.9    | 47.6   | 216      | 43.0   | 210.4    | 44.3   |
| Imported Drugs                                                | 152.2    | 35.9   | 149.2    | 34.1   | 174.6    | 37.3   | 174.9    | 36.8   |
| Nonprescription Drugs                                         | 73.1     | 17.2   | 80.1     | 18.3   | 92.3     | 19.7   | 90.1     | 19.0   |
| Vitamins, Nutrients, Tonics and Alternatives                  | 302.0    | 100.0  | 338.6    | 100.0  | 384.6    | 100.0  | 396.4    | 100.0  |
| Prescription Drugs                                            | 248.4    | 82.3   | 278.5    | 82.3   | 314.6    | 81.8   | 315.5    | 79.6   |
| Domestic Drugs                                                | 216.1    | 71.6   | 247.9    | 73.2   | 277.7    | 72.2   | 285.3    | 72.0   |
| Imported Drugs                                                | 32.3     | 10.7   | 30.6     | 9.0    | 36.9     | 9.6    | 30.2     | 7.6    |
| Nonprescription Drugs                                         | 53.6     | 17.7   | 60.0     | 17.7   | 70.0     | 18.2   | 81.0     | 20.4   |
| Gastrointestinal and Genitourinary Agents                     | 291.4    | 100.0  | 318.2    | 100.0  | 363.0    | 100.0  | 381.5    | 100.0  |
| Prescription Drugs                                            | 206.9    | 71.0   | 228.5    | 71.8   | 271.2    | 74.7   | 282.8    | 74.1   |
| Domestic Drugs                                                | 174.9    | 60.0   | 188.9    | 59.4   | 200.0    | 55.1   | 194.4    | 51.0   |
| Imported Drugs                                                | 32.1     | 11.0   | 39.6     | 12.4   | 71.1     | 19.6   | 88.3     | 23.1   |
| Nonprescription Drugs                                         | 84.5     | 29.0   | 89.8     | 28.2   | 91.9     | 25.3   | 98.8     | 25.9   |

Note: Imported prescription drugs are compounds made primarily from imported ingredients, including raw powder, undiluted solutions and bulk goods.

Source: Ministry of Health and Welfare, Pharmaceutical Affairs Bureau

Table 4: R&amp;D Spending by Japan's Pharmaceutical Industry, FY 1979-FY 1983

|                                             | FY 1979 | FY 1980 | FY 1981 | FY 1982 | FY 1983   |
|---------------------------------------------|---------|---------|---------|---------|-----------|
| Total Expenditures (in billions of yen)     | Y175.9  | Y189.8  | Y218.4  | Y239.8  | Y289.9    |
| Total Expenditures (in million of dollars*) | \$770.3 | \$873.8 | \$960.1 | \$960.7 | \$1,226.7 |
| Percent of Sales                            | 5.5%    | 5.5%    | 5.9%    | 5.6%    | 6.6%      |

\*The following average annual exchange rates were used to convert the yen figures into dollars: FY 1979, Y229.66; FY 1980, Y217.25; FY 1981, Y227.52; FY 1982, Y249.64; and FY 1983, Y236.33.

Source: Management and Coordination Agency, Statistics Bureau, Report on the Survey of Research and Development 1984

Table 5: R&amp;D Spending by Japanese Pharmaceutical Companies by Sales Volume, FY 1983

| Sales Volume<br>(million yen) | Number of<br>Companies | Total Sales<br>(million yen) | Total<br>Operating<br>Income<br>(million yen) | Total R&D<br>Personnel | Total R&D<br>Spending<br>(million yen) | Percent<br>of Sales |
|-------------------------------|------------------------|------------------------------|-----------------------------------------------|------------------------|----------------------------------------|---------------------|
| Total                         | 438                    | Y4,398,200                   | Y455,651                                      | 21,375                 | Y289,896                               | 6.6%                |
| Under Y100                    | 17                     | 700                          | 68                                            | 44                     | 69                                     | 9.6                 |
| Y100-Y1,000                   | 191                    | 83,100                       | 6,935                                         | 616                    | 2,419                                  | 2.9                 |
| Y1,000-Y10,000                | 161                    | 562,300                      | 51,326                                        | 3,331                  | 27,635                                 | 4.9                 |
| Y10,000 or More               | 69                     | 3,752,100                    | 397,322                                       | 17,384                 | 259,774                                | 6.9                 |

Source: Management and Coordination Agency, Statistics Bureau, Report on the Survey of Research and Development 1984

Table 6: Nature of R&amp;D Spending by Japanese Pharmaceutical Companies by Size of Capital, FY 1983

| Capital<br>(million yen) | Number of<br>Companies | R&D Spending<br>(million yen) |         |         |             | Distribution |         |             |
|--------------------------|------------------------|-------------------------------|---------|---------|-------------|--------------|---------|-------------|
|                          |                        | Total                         | Basic   | Applied | Development | Basic        | Applied | Development |
| Total                    | 435                    | Y289,896                      | Y51,543 | Y70,655 | Y167,698    | 17.8%        | 24.4%   | 57.8%       |
| Y5-Y10                   | 63                     | 390                           | 14      | 7       | 368         | 3.7          | 1.8     | 94.5        |
| Y10-Y100                 | 235                    | 15,518                        | 3,082   | 3,925   | 8,512       | 19.9         | 25.3    | 54.9        |
| Y100-Y1,000              | 89                     | 46,248                        | 12,379  | 9,728   | 23,941      | 27.2         | 21.0    | 51.8        |
| Y1,000-Y10,000           | 38                     | 128,073                       | 19,161  | 32,985  | 75,928      | 15.0         | 25.8    | 59.3        |
| Y10,000 or More          | 10                     | 99,668                        | 16,708  | 24,011  | 58,949      | 16.8         | 24.1    | 59.1        |

Source: Management and Coordination Agency, Statistics Bureau, Report on the Survey of Research and Development 1984

Table 7: Financial Profiles of Major Japanese Pharmaceutical Makers, FY 1982-FY 1984

(in millions of yen)

|                                     | Worldwide<br>Pharmaceutical<br>Sales | Total Sales | Percent of<br>Non-Japan<br>Sales | Total<br>Operating<br>Income | Total R&D<br>Spending | Percent of<br>Total Sales |
|-------------------------------------|--------------------------------------|-------------|----------------------------------|------------------------------|-----------------------|---------------------------|
| Takeda Chemical Industries, Ltd.    |                                      |             |                                  |                              |                       |                           |
| FY 1982                             | Y290,829                             | Y469,079    | 6%                               | Y43,089                      | n.a.                  | n.a.                      |
| FY 1983                             | 291,667                              | 478,143     | 7                                | 40,274                       | Y28,800               | 6.0%                      |
| FY 1984                             | 289,659                              | 474,852     | 7                                | 36,135                       | 28,800                | 6.1                       |
| Sankyo Co., Ltd.                    |                                      |             |                                  |                              |                       |                           |
| FY 1982                             | 181,433                              | 221,260     | 1                                | 24,446                       | n.a.                  | n.a.                      |
| FY 1983                             | 192,909                              | 232,421     | 1                                | 24,277                       | 14,500                | 6.2                       |
| FY 1984                             | 201,803                              | 243,136     | 1                                | 22,729                       | 15,900                | 6.5                       |
| Fujisawa Pharmaceutical Co., Ltd.   |                                      |             |                                  |                              |                       |                           |
| FY 1982                             | 198,605                              | 198,605     | 5                                | 25,618                       | n.a.                  | n.a.                      |
| FY 1983                             | 203,757                              | 203,757     | 5                                | 19,908                       | 17,800                | 8.7                       |
| FY 1984                             | 196,675                              | 196,675     | 5                                | 13,894                       | 18,700                | 9.5                       |
| Shionogi & Co., Ltd.                |                                      |             |                                  |                              |                       |                           |
| FY 1982                             | 130,358                              | 181,053     | 1                                | 23,361                       | n.a.                  | n.a.                      |
| FY 1983                             | 124,111                              | 177,502     | 2                                | 22,296                       | 15,000                | 8.5                       |
| FY 1984                             | 127,653                              | 185,005     | 2                                | 19,154                       | 16,000                | 8.6                       |
| Eisai Co., Ltd.                     |                                      |             |                                  |                              |                       |                           |
| FY 1982                             | 99,650                               | 127,737     | 7                                | 19,165                       | n.a.                  | n.a.                      |
| FY 1983                             | 108,268                              | 135,335     | 6                                | 18,776                       | 15,100                | 11.2                      |
| FY 1984                             | 108,318                              | 135,398     | 7                                | 15,067                       | 16,200                | 12.0                      |
| Yamanouchi Pharmaceutical Co., Ltd. |                                      |             |                                  |                              |                       |                           |
| CY 1982                             | 94,540                               | 94,540      | 0                                | 14,669                       | n.a.                  | n.a.                      |
| CY 1983                             | 104,804                              | 104,804     | 0                                | 15,467                       | 10,000                | 9.5                       |
| CY 1984                             | 107,511                              | 107,511     | 5                                | 15,092                       | 10,700                | 10.0                      |
| Tanabe Seiyaku Co., Ltd.            |                                      |             |                                  |                              |                       |                           |
| FY 1982                             | 98,897                               | 135,475     | 7                                | 16,194                       | n.a.                  | n.a.                      |
| FY 1983                             | 104,494                              | 143,143     | 8                                | 14,121                       | 10,600                | 7.4                       |
| FY 1984                             | 105,382                              | 148,426     | 12                               | 13,304                       | 12,400                | 8.4                       |

Note: Data on a fiscal year basis can be converted into dollars using the following exchange rates: FY 1982, Y249.64; FY 1983, Y236.33; and FY 1984, Y244.19. For calendar year exchange rates, see Table 1.

Source: Toyo Keizai Shinposha, Kaisha Shikiho (Company Quarterly Report)

Table 8: U.S. Pharmaceutical Market, 1980-84

(in millions of dollars)

|                                                                | 1980       | 1981       | 1982       | 1983       | 1984       |
|----------------------------------------------------------------|------------|------------|------------|------------|------------|
| Shipments                                                      | \$17,674.3 | \$20,041.7 | \$22,955.1 | \$25,653.1 | \$27,617.5 |
| Total Exports (f.a.s.)                                         | 2,045.6    | 2,281.5    | 2,378.9    | 2,618.2    | 2,749.3    |
| Total Imports (Customs f.a.s.)                                 | 916.7      | 1,020.6    | 1,078.3    | 1,311.9    | 1,662.0    |
| Trade Balance                                                  | 1,128.9    | 1,260.9    | 1,300.6    | 1,306.3    | 1,087.3    |
| Exports to Japan (f.a.s.)                                      | 334.1      | 441.2      | 501.4      | 532.4      | 559.3      |
| Imports from Japan (Customs f.a.s.)                            | 111.8      | 135.1      | 125.5      | 162.0      | 162.3      |
| Trade Balance                                                  | 222.3      | 306.1      | 375.9      | 370.4      | 397.0      |
| Total Exports as Percent of Shipments                          | 11.6%      | 11.4%      | 10.4%      | 10.2%      | 10.0%      |
| Total Imports as Percent of Apparent Domestic Consumption      | 5.5%       | 5.4%       | 5.0%       | 5.4%       | 6.3%       |
| Exports to Japan as Percent of Shipments                       | 1.9%       | 2.2%       | 2.2%       | 2.1%       | 2.0%       |
| Imports from Japan as Percent of Apparent Domestic Consumption | 0.7%       | 0.7%       | 0.6%       | 0.7%       | 0.6%       |

Table 9: U.S. Shipments of Pharmaceuticals, 1980-84

(in millions of dollars)

|                                           | 1980      | 1981      | 1982      | 1983      | 1984      |
|-------------------------------------------|-----------|-----------|-----------|-----------|-----------|
| Central Nervous System Agents             | \$2,821.0 | \$3,282.6 | \$3,841.4 | \$4,439.0 | \$4,995.1 |
| Antibiotics and Other Anti-infectives     | 1,778.3   | 2,081.9   | 2,438.0   | 2,820.2   | 3,034.8   |
| Cardiovascular Agents                     | 1,176.4   | 1,397.1   | 1,842.5   | 2,264.2   | 2,680.8   |
| Vitamins and Nutrients                    | 1,876.5   | 2,042.6   | 2,170.8   | 2,454.8   | 2,279.7   |
| Hormones and Antitumor Agents             | 1,209.7   | 1,420.5   | 1,705.3   | 1,885.7   | 1,946.5   |
| Respiratory System Agents                 | 1,239.3   | 1,437.5   | 1,590.1   | 1,750.4   | 1,877.0   |
| Gastrointestinal and Genitourinary Agents | 1,232.3   | 1,381.5   | 1,419.5   | 1,611.7   | 1,695.0   |
| Dermatological Agents                     | 728.1     | 787.0     | 819.1     | 1,037.7   | 1,103.7   |
| Veterinary Preparations                   | 346.3     | 605.0     | 789.0     | 847.2     | 856.7     |
| Unspecified Preparations                  | 306.2     | 352.0     | 393.4     | 456.2     | 491.2     |
| Pharmaceutical Preparations of which:     | 12,914.3  | 14,787.7  | 17,009.1  | 19,567.1  | 20,960.5  |
| Prescription                              | 7,814.2   | 8,976.6   | 10,591.2  | 12,221.0  | 13,363.3  |
| Nonprescription                           | 4,530.2   | 5,143.1   | 5,316.6   | 6,318.1   | 6,547.0   |
| Bulk Shipments                            | 263.8     | 315.9     | 387.4     | 571.9     | 558.8     |
| Biologicals*                              | 1,602.0   | 1,857.0   | 2,293.0   | 2,581.0   | 3,187.0   |
| Medicinals and Botanicals**               | 3,158.0   | 3,597.0   | 3,653.0   | 3,505.0   | 3,470.0   |
| Total Shipments                           | 17,674.3  | 20,041.7  | 22,955.1  | 25,653.1  | 27,617.5  |

\*Biologicals include vaccines, antigens, antitoxins and toxoids as well as serums, plasmas and other blood derivatives.

\*\*Medicinals and botanicals are largely made up of bulk shipments.

Sources: Department of Commerce, Bureau of the Census, Current Industrial Reports: Pharmaceutical Preparations, Except Biologicals (data on pharmaceutical preparations); Department of Commerce, Bureau of the Census, Annual Survey of Manufactures (data on biologicals and medicinals and botanicals, 1980-83); Department of Commerce estimates (data on biologicals and medicinals and botanicals, 1984).

Table 10: R&amp;D Spending by the U.S. Pharmaceutical Industry, 1980-83\*

|                                                                   | 1980      | 1981      | 1982      | Budgeted<br>1983 |
|-------------------------------------------------------------------|-----------|-----------|-----------|------------------|
| Total Expenditures                                                | \$1,976.7 | \$2,339.5 | \$2,773.7 | \$3,259.6        |
| Company-Financed Expenditures                                     | 1,971.6   | 2,335.3   | 2,770.6   | 3,257.7          |
| Spent in United States                                            | 1,544.1   | 1,866.2   | 2,265.6   | 2,657.3          |
| Spent Abroad                                                      | 427.5     | 469.1     | 505.0     | 600.4            |
| U.S. Government Grants and Contracts<br>for Company-Conducted R&D | 5.1       | 4.2       | 3.1       | 1.9              |
| Total Sales                                                       | 22,513.0  | 23,530.0  | 25,654.0  | 28,317.0         |
| R&D Expenditures as Percent of Sales                              | 8.8%      | 9.9%      | 10.8%     | 11.5%            |

\*Figures apply to member companies of the Pharmaceutical Manufacturers Association only.

These 131 companies account for over 90 percent of the U.S. industry's sales of prescription drugs and over-the-counter professional products.

Source: Pharmaceutical Manufacturers Association, 1980-1983 Annual Survey Report

Table 11: Distribution of R&amp;D Money Spent in the United States by Product Class, 1980-82

|                                                    | 1980      | 1981      | 1982      |
|----------------------------------------------------|-----------|-----------|-----------|
| Total Expenditures (in millions of dollars)        | \$1,544.1 | \$1,866.2 | \$2,265.6 |
| Anti-infectives                                    | 17.4%     | 16.9%     | 16.3%     |
| Central Nervous System and Sense Organs            | 16.2      | 14.6      | 14.1      |
| Cardiovasculars                                    | 18.9      | 19.5      | 20.9      |
| Neoplasms, Endocrine System and Metabolic Diseases | 14.3      | 15.9      | 17.7      |
| Gastrointestinal and Genitourinary System          | 6.4       | 5.3       | 5.3       |
| Respiratory                                        | 4.8       | 4.7       | 5.0       |
| Biologicals                                        | 3.1       | 2.4       | 2.3       |
| Dermatologicals                                    | 3.2       | 2.7       | 2.4       |
| Vitamins                                           | 2.3       | 1.8       | 1.8       |
| Diagnostic (in vitro)                              | 1.0       | 1.4       | 1.3       |
| Other                                              | 6.9       | 9.4       | 8.1       |
| Veterinary Preparations                            | 5.1       | 4.8       | 4.3       |
| Veterinary Biologicals                             | 0.4       | 0.6       | 0.5       |
| Total                                              | 100.0     | 100.0     | 100.0     |

Source: Pharmaceutical Manufacturers Association, 1980-1983 Annual Survey Report

Table 12: Distribution of R&amp;D Money Spent in the United States by Function, 1980-82

|                                                   | 1980      | 1981      | 1982      |
|---------------------------------------------------|-----------|-----------|-----------|
| Total Expenditures (in millions of dollars)       | \$1,544.1 | \$1,866.2 | \$2,265.6 |
| Clinical Evaluation: Phases I, II, III            | 19.8%     | 19.7%     | 19.9%     |
| Biological Screening and Pharmacological Testing  | 18.6      | 18.5      | 17.9      |
| Synthesis and Extraction                          | 15.4      | 11.9      | 11.6      |
| Pharmaceutical Dosage Formulation and Stability   |           |           |           |
| Testing                                           | 9.2       | 9.8       | 10.4      |
| Toxicology and Safety Testing                     | 9.7       | 9.5       | 8.9       |
| Process Development for Manufacturing and Quality |           |           |           |
| Control                                           | 9.0       | 9.4       | 9.5       |
| Clinical Evaluation: Phase IV                     | 5.7       | 3.1       | 3.2       |
| Regulatory and Preparation, Submission and        |           |           |           |
| Processing of Applications                        | 4.1       | 3.7       | 3.9       |
| Bioavailability Studies                           | 2.1       | 2.7       | 2.8       |
| Other                                             | 8.4       | 11.7      | 11.9      |
| Total                                             | 100.0     | 100.0     | 100.0     |

Source: Pharmaceutical Manufacturers Association, 1980-1983 Annual Survey Report

Table 13: Financial Profiles of Major U.S. Manufacturers of Prescription Pharmaceuticals

(in millions of dollars)

|                                     | Worldwide<br>Pharmaceutical<br>Sales | Total Sales | Percent of<br>Non-U.S.<br>Sales | Worldwide<br>Pharmaceutical<br>Operating<br>Income | Total<br>Operating<br>Income | Total R&D<br>Spending | Percent of<br>Total Sales |
|-------------------------------------|--------------------------------------|-------------|---------------------------------|----------------------------------------------------|------------------------------|-----------------------|---------------------------|
| <b>Merck &amp; Co., Inc.</b>        |                                      |             |                                 |                                                    |                              |                       |                           |
| 1982                                | \$2,425.1                            | \$3,053.0   | 44%                             | \$244.0                                            | \$508.5                      | \$320.2               | 10.5%                     |
| 1983                                | 2,640.5                              | 3,246.1     | 43                              | 667.9                                              | 692.3                        | 356.1                 | 11.0                      |
| 1984                                | 2,917.8                              | 3,559.7     | 43                              | 724.2                                              | 779.3                        | 393.1                 | 11.0                      |
| <b>American Home Products Corp.</b> |                                      |             |                                 |                                                    |                              |                       |                           |
| 1982                                | 2,075.4                              | 3,972.7     | 28                              | 647.3                                              | 985.9                        | 134.9                 | 3.4                       |
| 1983                                | 2,278.1                              | 4,233.3     | 26                              | 713.9                                              | 1,079.7                      | 158.8                 | 3.7                       |
| 1984                                | 2,416.8                              | 4,485.3     | 23                              | 765.5                                              | 1,174.5                      | 183.7                 | 4.1                       |
| <b>Pfizer Inc.</b>                  |                                      |             |                                 |                                                    |                              |                       |                           |
| 1982                                | 1,594.0                              | 3,496.0     | 46                              | n.a.                                               | 620.9                        | 199.4                 | 5.7                       |
| 1983                                | 1,896.0                              | 3,730.0     | 45                              | n.a.                                               | 798.4                        | 227.2                 | 6.1                       |
| 1984                                | 1,891.0                              | 3,854.3     | 41                              | n.a.                                               | 875.2                        | 252.3                 | 6.6                       |
| <b>Eli Lilly and Co.</b>            |                                      |             |                                 |                                                    |                              |                       |                           |
| 1982                                | 1,535.2                              | 2,962.7     | 36                              | n.a.                                               | 706.9                        | 267.4                 | 9.0                       |
| 1983                                | 1,645.8                              | 3,033.7     | 34                              | n.a.                                               | 792.2                        | 293.6                 | 9.7                       |
| 1984                                | 1,664.1                              | 3,109.2     | 32                              | n.a.                                               | 813.9                        | 341.3                 | 11.0                      |
| <b>Bristol-Myers Co.</b>            |                                      |             |                                 |                                                    |                              |                       |                           |
| 1982                                | 1,560.2                              | 3,599.9     | 28                              | 294.8                                              | 656.9                        | 161.0                 | 4.5                       |
| 1983                                | 1,505.0                              | 3,917.0     | 26                              | 318.7                                              | 747.3                        | 185.3                 | 4.7                       |
| 1984                                | 1,586.0                              | 4,189.4     | 25                              | 336.3                                              | 808.7                        | 212.4                 | 5.1                       |
| <b>SmithKline Beckman Corp.</b>     |                                      |             |                                 |                                                    |                              |                       |                           |
| 1982                                | 1,559.5                              | 2,642.8     | 34                              | n.a.                                               | 670.0                        | 222.1                 | 8.4                       |
| 1983                                | 1,478.2                              | 2,835.4     | 33                              | n.a.                                               | 708.2                        | 264.7                 | 9.3                       |
| 1984                                | 1,542.2                              | 2,949.2     | 32                              | n.a.                                               | 705.0                        | 279.2                 | 9.5                       |
| <b>Abbott Laboratories</b>          |                                      |             |                                 |                                                    |                              |                       |                           |
| 1982                                | n.a.                                 | 2,602.4     | 32                              | n.a.                                               | 512.0                        | 137.0                 | 5.3                       |
| 1983                                | 1,423.0                              | 2,927.9     | 30                              | n.a.                                               | 626.0                        | 184.5                 | 6.3                       |
| 1984                                | 1,534.0                              | 3,104.0     | 30                              | n.a.                                               | 704.0                        | 218.7                 | 7.1                       |
| <b>Warner-Lambert Co.</b>           |                                      |             |                                 |                                                    |                              |                       |                           |
| 1982                                | 1,286.0                              | 2,971.0     | 45                              | 284.0                                              | 477.0                        | 145.0                 | 4.9                       |
| 1983                                | 1,403.0                              | 3,108.0     | 41                              | 328.0                                              | 503.0                        | 175.0                 | 5.6                       |
| 1984                                | 1,409.0                              | 3,167.0     | 40                              | 339.0                                              | 523.0                        | 195.0                 | 6.2                       |
| <b>Schering &amp; Johnson</b>       |                                      |             |                                 |                                                    |                              |                       |                           |
| 1982                                | 1,118.6                              | 3,760.9     | 43                              | 314.7                                              | 787.2                        | 363.2                 | 6.3                       |
| 1983                                | 1,175.8                              | 3,972.9     | 40                              | 345.6                                              | 724.1                        | 405.1                 | 6.8                       |
| 1984                                | 1,293.7                              | 4,124.5     | 39                              | 427.0                                              | 755.1                        | 421.2                 | 6.9                       |
| <b>Dupont Co.</b>                   |                                      |             |                                 |                                                    |                              |                       |                           |
| 1982                                | 1,084.0                              | 1,835.0     | 38                              | n.a.                                               | 197.0                        | 195.8                 | 10.7                      |
| 1983                                | 1,173.0                              | 1,993.2     | 36                              | n.a.                                               | 251.3                        | 229.2                 | 11.5                      |
| 1984                                | 1,272.0                              | 2,188.2     | 34                              | n.a.                                               | 282.9                        | 258.2                 | 11.8                      |
| <b>Squibb Corp.</b>                 |                                      |             |                                 |                                                    |                              |                       |                           |
| 1982                                | 978.3                                | 1,660.3     | 35                              | 122.4                                              | 109.5                        | 123.0                 | 7.4                       |
| 1983                                | 1,043.1                              | 1,788.0     | 32                              | 186.2                                              | 255.6                        | 141.7                 | 8.0                       |
| 1984                                | 1,089.7                              | 1,880.0     | 28                              | 207.2                                              | 290.7                        | 150.7                 | 8.0                       |
| <b>Schering-Plough Corp.</b>        |                                      |             |                                 |                                                    |                              |                       |                           |
| 1982                                | 944.7                                | 1,719.2     | 48                              | 179.1                                              | 289.3                        | 125.6                 | 7.3                       |
| 1983                                | 996.0                                | 1,808.5     | 45                              | 186.3                                              | 307.6                        | 144.7                 | 8.0                       |
| 1984                                | 1,056.8                              | 1,874.3     | 43                              | 203.9                                              | 326.1                        | 163.6                 | 8.7                       |

Note: Depending on how a company breaks out its business segments, the figures for pharmaceutical sales might include products other than prescription pharmaceuticals. For no company, though, do the figures reflect sales of nonprescription drugs.

Source: Company annual reports